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Drawing selection

Representative draw

# FULL CONTENTS CLAIM + DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

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## Notes:

1. Untranslatable words are replaced with asterisks (\* \*\* \*).
2. Texts in the figures are not translated and shown as it is.

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Dictionary: Last updated 05/30/2008 / Priority:

## FULL CONTENTS

### [Claim(s)]

[Claim 1] The conveyance mechanism in which prepare a photovoltaic cell, the supply stage to which a tab lead is supplied, and the connection stage where a tab lead is electrically connected to a photovoltaic cell, and a photovoltaic cell and a tab lead are conveyed on a connection stage from a supply stage, Soldering equipment of the tab lead characterized by having the maintenance mechanism in which the photovoltaic cell conveyed by this conveyance mechanism and a tab lead are held.

[Claim 2] Said maintenance mechanism is soldering equipment of the tab lead according to claim 1 characterized by having the attachment component which moves synchronizing with the photovoltaic cell conveyed by said conveyance mechanism, holding said tab lead.

[Claim 3] Soldering equipment of the tab lead according to claim 1 or 2 characterized by forming the preliminary heating heater which carries out preliminary heating of the solder, this heating heater which heats solder to melting temperature, and the pusher who forces a tab lead to a photovoltaic cell in said connection stage.

### [Detailed Description of the Invention]

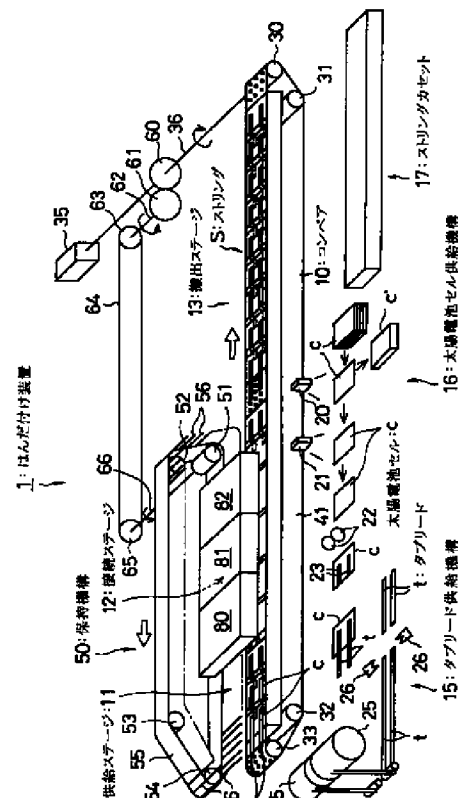
[0001]

[Field of the Invention] This invention relates to the soldering equipment for soldering a tab lead to a photovoltaic cell which can be used suitably in the manufacture process of a solar cell.

[0002]

[Description of the Prior Art] Various development is made about the solar cell that solar energy should be utilized in recent years. Moreover, various things, such as an amorphous type solar cell using amorphous silicone (amorphous silicon) besides a solar cell form of solar cell crystal-type [ using single crystal silicon or polycrystalline silicon ], are thought out.

[0003] This solar cell is manufactured through the process which connects electrically two or more photovoltaic cells which change solar energy into electric energy by tab lead, and forms



[Translation done.]

a string, and the process laminated on both sides of this string between a transparent cover glass and a transparent protective layer. [ the soldering equipment conventionally used in the soldering process of such a solar cell ] A tab lead is suppressed by a pin to the surface electrode of the photovoltaic cell fixed on the stage using \*\*\*\*\* etc., and it has composition to which melting of the solder which heated at the heater and was made to intervene between the surface electrodes of a tab lead and a photovoltaic cell is carried out.

[0004]

[Problem to be solved by the invention] However, conventional soldering equipment was performing the process which positions a tab lead to the surface electrode of a photovoltaic cell, the process which heats solder and sticks a tab lead to the surface electrode of a photovoltaic cell by pressure, etc. on the same stage. For this reason, if it was not after completing the soldering process over one photovoltaic cell, the following photovoltaic cell cannot be carried in on a stage, but a soldering process takes time, and it was hard to aim at improvement in productivity.

[0005] On the other hand, in order to raise efficiency, two or more stages are prepared, and the soldering equipment which was made to perform processes, such as positioning of a tab lead, and heating, sticking by pressure, on each stage in parallel, respectively is also considered. However, if it does so, you have to establish the positioning mechanism of a tab lead, a heating machine style, a sticking-by-pressure mechanism, etc. for every stage, respectively. Therefore, it will become expensive [ soldering equipment ] and large-sized, and will become the factor which makes manufacture cost of a solar cell high.

[0006] Therefore, the purpose of this invention is to offer the soldering equipment which arranges a tab lead correctly to the surface electrode of a photovoltaic cell, and can do soldering efficiently, though it is cheap and small.

[0007]

[Means for solving problem] If it is in Claim 1 in order to attain this purpose The conveyance mechanism in which prepare a photovoltaic cell, the supply stage to which a tab lead is supplied, and the connection stage where a tab lead is electrically connected to a photovoltaic cell, and a photovoltaic cell and a tab lead are conveyed on a connection stage from a supply stage, The soldering equipment of the tab lead characterized by having the maintenance mechanism in which the photovoltaic cell conveyed by this conveyance mechanism and a tab lead are held is offered.

[0008] If it is in the soldering equipment of this Claim 1, on a supply stage, a photovoltaic cell and a tab lead are supplied first. In this case, where a photovoltaic cell and a tab lead are positioned beforehand, a supply stage may be supplied and a photovoltaic cell and a tab lead may be positioned on a supply stage. And these photovoltaic cells and a tab lead are conveyed from a supply stage by a conveyance mechanism on a connection stage. Moreover, a photovoltaic cell and a tab lead are held by a maintenance mechanism during conveyance by this conveyance mechanism. And a tab lead is electrically connected to a photovoltaic cell on a connection stage.

[0009] Therefore, by having prepared the supply stage and the connection stage independently according to the soldering equipment of this Claim 1 Performing a photovoltaic cell, supply of a tab lead, positioning, etc. on a supply stage, a tab lead can be electrically connected to a photovoltaic cell on a connection stage, and it becomes possible to perform in parallel a process which is different on a supply stage and a connection stage, respectively. In addition, during conveyance to a connection stage from a supply stage, since a photovoltaic cell and a tab lead are held by a maintenance mechanism, a position gap of a photovoltaic cell and a tab lead is not produced. Since it becomes unnecessary to prepare a heating machine style, a sticking-by-pressure mechanism, etc. in a supply stage and becomes unnecessary to prepare the positioning mechanism of a tab lead etc. in a connection stage on the other hand, if it is in the soldering equipment of this Claim 1 Soldering equipment serves as small size and a low price, and the manufacture cost of a solar cell can be low pressed down now. Moreover, a string can be efficiently manufactured now continuously by making electric connection of supply of a photovoltaic cell, and positioning and a tab lead in parallel.

[0010] In the soldering equipment of this Claim 1, as indicated to Claim 2, said maintenance mechanism may be equipped with the attachment component which moves synchronizing with the photovoltaic cell conveyed by said conveyance mechanism, holding said tab lead.

[0011] If it is in the soldering equipment of this Claim 2, while conveying the photovoltaic cell and tab lead which were supplied on the supply stage to a connection stage, a tab lead can be held by an attachment component. For this reason, there is no fear of a tab lead shifting during conveyance by a conveyance mechanism.

[0012] Moreover, as indicated to Claim 3, you may form the preliminary heating heater which carries out preliminary heating of the solder, this heating heater which heats solder to melting temperature, and the pusher who forces a tab lead to a photovoltaic cell in said connection stage.

[0013] If it is in the soldering equipment of this Claim 3, after carrying out preliminary heating of the solder at a preliminary heating heater, on a connection stage, solder is first heated to melting temperature at this heating heater. Furthermore, a tab lead is electrically connected to a photovoltaic cell by forcing a tab lead to a photovoltaic cell with a pusher.

[0014]

[Mode for carrying out the invention] Hereafter, Drawings are made reference and the form of desirable operation of this invention is explained. Drawing 1 is the perspective view showing roughly the whole soldering equipment 1 concerning the form of operation of this invention.

[0015] This soldering equipment 1 is equipped with the conveyor 10 as a conveyance mechanism in which photovoltaic cell c and the tab lead t are conveyed rightward in a figure. The introductory position of this conveyor 10 (The supply stage 11 supplied to left end position) of a conveyor 10 at ( drawing 1 where the tab lead t and photovoltaic cell c are positioned is formed, and rather than this supply stage 11 [ the lower stream side (at drawing 1 , it is right-hand side / stage / 11 / supply / ) of the conveyance direction of a conveyor 10 ] The connection stage 12 which connects the tab lead t to photovoltaic cell c electrically is formed. Furthermore, with the form of this operation, the taking-out stage 13 which takes out the string s by whom soldering was completed and was manufactured with soldering equipment 1 rather than the connection stage 12 at the lower stream side (it is right-hand side [ stage / 12 / connection ] at drawing 1 ) of the conveyance direction of a conveyor 10 is formed.

[0016] [ the side ( drawing 1 front of a conveyor 10) of a conveyor 10 ] The string cassette 17 for stocking the tab lead feed mechanism 15 which supplies the tab lead t, the photovoltaic cell feed mechanism 16 which supplies photovoltaic cell c, and the string s manufactured with this soldering equipment 1 is arranged. The string cassette 17 is arranged in the side ( drawing 1 front of the taking-out stage 13) of the taking-out stage 13. And according to the taking-out mechanism in which the string s by whom soldering was completed and was manufactured with soldering equipment 1 is not illustrated, it takes up from on a conveyor 10 on the taking-out stage 13, and delivers to the string cassette 17 so that it may mention later.

[0017] The photovoltaic cell feed mechanism 16 is equipped with cameras 20 and 21 and a pair of flux application rollers 22. And [ taking out at a time one photovoltaic cell c stored by two or more suitable containers (for example, carrier cassette) etc., and conveying it ] Deficits, such as a crack, are inspected with a camera 20, and after positioning with a camera 21, it has composition which applies the flux 23 for making soldering good with the flux application roller 22 to the surface of photovoltaic cell c. Moreover, photovoltaic cell c' by which the deficit was discovered with the camera 20 is discharged by the side ( drawing 1 front) according to the exclusion mechanism which is not illustrated.

[0018] The tab lead feed mechanism 15 is equipped with a pair of rolls 25 and a pair of cutters 26 by which the tab lead t was twisted. Solder is applied to the surface of the tab lead t. And a cutter 26 cuts the tab lead t which it let out continuously from a roll 25 to respectively suitable length, and it has composition which positions the tab lead t cut to photovoltaic cell [ of one sheet ] c in a predetermined position, and it carries two sheets at a time in the example of illustration. Thus, when the tab lead t is positioned and put on the surface of photovoltaic cell c, the flux 23 applied with the above-mentioned flux application roller 22 intervenes between the tab lead t and photovoltaic cell c.

[0019] Moreover, photovoltaic cell c in the state where positioned the tab lead t on the surface in this way, and it was carried by the conveyance mechanism equipped with the

adsorption pad etc. which is not illustrated is carried on a conveyor 10 on the supply stage 11.

[0020] The conveyor 10 is wound around the driving roller 30 located in a right end, and other three driven rollers 31, 32, and 33 in the example of illustration. The intermittent rotation power (the example of illustration rotation power of the clock hand of cut) of the motor 35 which consists of a servomotor etc., for example is transmitted to the driving roller 30 through the axis 36. And by operation of a motor 35, a conveyor 10 is intermittently \*\*\*\* (ed) to the clock hand of cut in a figure, and, thereby, photovoltaic cell c carried on the conveyor 10 on the supply stage 11 moves it intermittently in order of the connection stage 12 and the taking-out stage 13.

[0021] By establishing many inspiratory ports 40 in the surface of the conveyor 10, and inhaling air from an inspiratory port 40 by decompression operation of the air supply chamber 41 arranged inside a conveyor 10, as shown in drawing 2 Photovoltaic cell c carried on the conveyor 10 on the supply stage 11 is adsorbed on a conveyor 10. Thereby, while being conveyed in order of the connection stage 12 and the taking-out stage 13 from the supply stage 11, it has composition which carries out adsorption maintenance of the photovoltaic cell c.

[0022] Drawing 3 (a) and (b) show the state where photovoltaic cell c and the tab lead t which are carried by each on a conveyor 10 on the supply stage 11 were seen from the upper part here. As first shown in drawing 3 (a), on the supply stage 11, the photovoltaic cell c1 in the state where positioned the tab lead t1 on the surface, and it was carried is supplied on a conveyor 10. That is, with the form of this operation, the tab lead t1 of two is carried to the photovoltaic cell c1 of one sheet. The tab lead t1 of these two is arranged so that each may overflow on the photovoltaic cell c1 into the upper stream side ( drawing 3 (a) left-hand side of the photovoltaic cell c1) of the conveyance direction of a conveyor 10, and by this It is positioned so that the two tip side ( drawing 3 (a) right-hand side of the tab lead t1) of the tab lead t1 may contact the upper surface electrode (not shown) prepared in the upper surface of the photovoltaic cell c1. In addition, when supplying the photovoltaic cell c1 and the tab lead t1 in this way, the conveyor 10 is in the state where it stopped.

[0023] [ with next, intermittent conveyance of the conveyor 10 where the tab lead t1 and the photovoltaic cell c1 are positioned on the supply stage 11 after being supplied on the conveyor 10 in this way ] The tab lead t1 and the photovoltaic cell c1 move only a predetermined distance, and it is constituted so that a conveyor 10 may stop again after that. Moreover, after a re-stop of this conveyor 10, on the supply stage 11, on a conveyor 10, as shown in drawing 3 (b), the next photovoltaic cell c2 in the state where positioned the tab lead t2 of two on the surface like the point, and it was carried is supplied. and when supplying the following photovoltaic cell c2 in this way [ the tip side ( drawing 3 (b) right-hand side of the photovoltaic cell c2) of the photovoltaic cell c2 ] as drawing 3 (a) explained previously It is arranged so that it may appear on the back end side ( drawing 3 (b) left-hand side of the tab lead t1) of the tab lead t1 arranged by overflowing on the photovoltaic cell c1 into the upper stream side ( drawing 3 (b) left-hand side of the photovoltaic cell c1) of the conveyance direction of a conveyor 10. It is positioned so that the undersurface electrode (not shown) prepared in the undersurface of the photovoltaic cell c2 may contact the two back end side ( drawing 3 (b) left-hand side of the tab lead t1) of the tab lead t1 from a top by this.

[0024] And by repeating the process explained by this drawing 3 (a) and (b) On the supply stage 11, photovoltaic cell c of a predetermined number and the tab lead t are carried one by one on a conveyor 10, and it has composition which is positioned and is supplied between the upper surface electrode of each photovoltaic cell c, and an undersurface electrode after the tab lead t has contacted. In addition, the conveyance mechanism equipped with the adsorption pad etc. which is not illustrated is used for supply of each photovoltaic cell c in the above supply stages 11, and the tab lead t.

[0025] Next, as shown in drawing 1 , while being conveyed from the supply stage 11 on the connection stage 12, the maintenance mechanism 50 for holding the state where it was positioned so that the tab lead t might contact the upper surface electrode and undersurface

electrode of photovoltaic cell c is established above the conveyor 10. This maintenance mechanism 50 is equipped with two or more presser bars 56 attached to the peripheral surface of the endless belt 55 wound around the driving roller 51 and three driven rollers 52, 53, and 54, and this endless belt 55 at the predetermined intervals. So that the endless belt 55 may be arranged in parallel with a conveyor 10 [ above a conveyor 10 ] in the side ( drawing 1 back of the supply stage 11 and the connection stage 12) and it may project in the side ( drawing 1 front of the endless belt 55) of the endless belt 55 The tip portion of each attached presser bar 56 is arranged above the conveyor 10. The intermittent rotation power of the above-mentioned motor 35 minds an axis 36, gears 60 and 61, an axis 62, the timing belt pulley 63, a timing belt 64, the timing belt pulley 65, and an axis 66 51. the hand of cut (the example of illustration anti-clock hand of cut) opposite at the circumferential speed as the driving roller 30 of a conveyor 10 with the same driving roller 51 transmitted -- and it rotates to the same timing as the driving roller 30. Each presser bar 56 which \*\*\*\*(ed) the endless belt 55 intermittently to the same circumference speed as a conveyor 10 and the same timing to the \*\*\*\*\* clock hand of cut by this, and was attached to the undersurface side of the endless belt 55 facing the upper surface of a conveyor 10 The same direction as the upper surface of a conveyor 10 In ( drawing 1 , it has composition which moves intermittently at the same speed as rightward).

[0026] As shown in drawing 4 and 5, each presser bar 56 is supported in the maintenance mechanism 50 by the supporter material 70 fixed to the peripheral face of the endless belt 55 at the predetermined intervals. Moreover, the tip portion of each presser bar 56 projected and arranged in the side of the endless belt 55 so that it may be located above a conveyor 10 is equipped with every two attachment components 72 through the spring part 71. The attachment component 72 has the composition of having attached to the spring part 71 the both ends of wire rods, such as metal which carried out the shape of abbreviation U type as a whole. And by energizing rotation of the attachment component 72 so that these two attachment components 72 may be forced below with the elasticity of the spring part 71 It has the composition of suppressing two tab leads t arranged on the upper surface of photovoltaic cell c carried on the conveyor 10, respectively, and holding them from a top by the attachment component 72.

[0027] Where [ moreover, ] the tab lead t of the upper surface of photovoltaic cell c is held by the attachment component 72 in this way By moving intermittently at the same speed as the same direction as the upper surface of a conveyor 10, while each presser bar 56 faces the upper surface of a conveyor 10 in connection with \*\*\*\*\* of the endless belt 55, as explained previously Photovoltaic cell c and the tab lead t which were carried on the conveyor 10 have composition conveyed in the state where a position gap is not produced from the supply stage 11 to the connection stage 12.

[0028] Next, as shown in drawing 1 , on the connection stage 12, the preliminary heating heater 80, this heating heater 81, and the pusher 82 are formed above the conveyor 10. As shown in drawing 6 , the preliminary heating heater 80 and this heating heater 81 are equipped with the lamp heaters 85 and 86. Moreover, the pusher 82 has the pusher rod 87. And photovoltaic cell c carried on the conveyor 10 on the supply stage 11 and the tab lead t are moved one by one by intermittent conveyance of the conveyor 10 explained previously under these preliminary heating heater 80, this heating heater 81, and the pusher 82. By this if photovoltaic cell c and the tab lead t are carried in to the connection stage 12 by operation of a conveyor 10 First, in the preliminary heating heater 80 [ with the irradiation from the lamp heater 85 ] Preliminary heating of the solder applied to the surface of the tab lead t is carried out, next it sets at this heating heater 81. The solder applied to the surface of the tab lead t by the irradiation from the lamp heater 86 fuses, and further, when the pusher rod 87 descends in a pusher 82, it has the composition that the tab lead t is forced to photovoltaic cell c in the lower end of the pusher rod 87. Moreover, in this way [ with conveyance of a conveyor 10 ] While photovoltaic cell c and the tab lead t are moved one by one under the preliminary heating heater 80, this heating heater 81, and the pusher 82, a position gap is prevented by holding the tab lead t arranged on the upper surface of photovoltaic cell c by the attachment component 72.

[0029] Now, if it is in the soldering equipment 1 concerning the form of operation of this

invention constituted as mentioned above, two tab leads t supplied from the tab lead feed mechanism 15 are first put on an every predetermined position to photovoltaic cell c supplied one sheet at a time from the photovoltaic cell feed mechanism 16. And photovoltaic cell c in the state where positioned the tab lead t on the surface and it was carried by the conveyance mechanism which is not illustrated is carried on a conveyor 10 on the supply stage 11.

[0030] Next, photovoltaic cell c carried on the conveyor 10 in this way moves intermittently in order of the connection stage 12 and the taking-out stage 13 from the supply stage 11 by intermittent \*\*\*\* of the conveyor 10. A position gap of photovoltaic cell c and the tab lead t is prevented by two tab leads t which adsorption maintenance of the photovoltaic cell c was carried out on the conveyor 10 during this movement, and have been arranged on the upper surface of photovoltaic cell c being suppressed by the attachment component 72 from a top, and being held.

[0031] And on the connection stage 12, preliminary heating of the solder applied to the surface of the tab lead t in the preliminary heating heater 80 is carried out first. Next, melting of the solder applied to the surface of the tab lead t in this heating heater 81 is carried out. Furthermore, in a pusher 82, the tab lead t is forced to photovoltaic cell c. Thereby on the connection stage 12, the tab lead t is electrically connected to photovoltaic cell c.

[0032] And the string s manufactured by connecting the tab lead t to photovoltaic cell c electrically on the connection stage 12 in this way is taken out on the taking-out stage 13. And on the taking-out stage 13, by the taking-out mechanism which is not illustrated, the string s manufactured in this way is taken up from on a conveyor 10, receives in the string cassette 17 one by one, and is passed to it.

[0033] [ performing photovoltaic cell c, supply of the tab lead t, positioning, etc. on the supply stage 11 according to the soldering equipment 1 of the form of this operation ] by connecting the tab lead t to photovoltaic cell c electrically on the connection stage 12 It is possible to perform a different process on two stages 11 and 12 in parallel. And since it is not necessary to prepare a heating machine style, a sticking-by-pressure mechanism, etc. in the supply stage 11, and to prepare the positioning mechanism of the tab lead t etc. in the connection stage 12, small and cheap soldering equipment 1 can be offered, and the manufacture cost of a solar cell can also be reduced. Moreover, String s can be efficiently manufactured continuously by making electric connection of supply of photovoltaic cell c or the tab lead t, positioning, and photovoltaic cell c and the tab lead t in parallel. Moreover, two tab leads t which adsorption maintenance of the photovoltaic cell c was carried out on the conveyor 10 during conveyance to the connection stage 12 from the supply stage 11, and have been arranged on the upper surface of photovoltaic cell c [ with the attachment component 72 ] Since it is pressed down and held from a top, a position gap of photovoltaic cell c and the tab lead t is not produced.

[0034] As mentioned above, although an example of the form of desirable operation of this invention was explained, this invention of not being restricted to the form of the operation explained above is natural, and can carry out modification implementation suitably. For example, although the case where the supply stage 11 was supplied where photovoltaic cell c and the tab lead t are positioned beforehand was explained, you may constitute from an example of illustration so that photovoltaic cell c and the tab lead t may be positioned on the supply stage 11.

[0035] Moreover, in the preliminary heating heater 80 or this heating heater 81, you may be made to heat using a hot wind. Any of far-infrared rays, near-infrared rays, and inside infrared rays are sufficient as the lamp heaters 85 and 86 formed in these preliminary heating heater 80 and this heating heater 81, and they may be replaced with the lamp heaters 85 and 86, and a ceramic heater may be used for them. Moreover, the installation number of the preliminary heating heater 80 and this heating heater 81 is arbitrary, and may be installed two or more pieces. Moreover, the preliminary heating heater 80 is also omissible. Moreover, it is possible to set up suitably according to the kind of the devices (photovoltaic cell c etc.) and solder which can set up arbitrarily the cooking temperature of the preliminary heating heater 80 or this heating heater 81, and are heated, and flux.

[0036] In addition, since photovoltaic cell c is heated at the preliminary heating heater 80 or this heating heater 81 in the state where it put on the conveyor 10, when the conveyor 10 consists of steel belts etc., there is a fear of a steel belt being heated and the upper surface of

a conveyor 10 producing modification of curvature etc. If the upper surface of a conveyor 10 curves, photovoltaic cell c will become unstable on a conveyor 10, and will become the cause that a position gap and soldering are poor. Then, in order to prevent modification of such a conveyor 10, it is good to make into the form of junior and senior high schools (crown) the driving roller 30 around which the conveyor 10 is wound, and the driven rollers 31, 32, and 33. Moreover, it is also possible to form a tension controller in some or all of the driving roller 30 or the driven rollers 31, 32, and 33, and to prevent modification of a conveyor 10. Moreover, on the connection stage 12 where the preliminary heating heater 80, this heating heater 81, and the pusher 82 exist, it is also possible to adsorb from under a conveyor 10, or to press down a conveyor 10 from the bottom, and to press down the curvature of a conveyor 10.

[0037] Moreover, in order to prevent modification of such a conveyor 10, as shown in drawing 7, it is good also as composition which divided the conveyor 10 into two or more belts (the example of illustration 3) 90, 91, and 92. in this case, the belt 91 which is located under the tab lead t by which the belts 90 and 92 located in both sides were positioned by photovoltaic cell c, and is located in the center -- photovoltaic cell c -- it is good to arrange so that a center may be supported mostly.

[0038] Moreover, forcing the tab lead t on photovoltaic cell c in a pusher 82, you may constitute so that a blow etc. may be performed simultaneously and it may cool. In addition, since photovoltaic cell c usually consists of an outstanding material of the thermal conductivity of silicon etc., in the preliminary heating heater 80 or this heating heater 81, it is possible to be able to heat the both-sides side of photovoltaic cell c simultaneously, and to solder the tab lead t to the both-sides side of photovoltaic cell c simultaneously. However, the preliminary heating heater 80 and this heating heater 81 may be made to correspond, and a heater may be installed also in the conveyor 10 bottom. In that case, a hot plate etc. can be used for the heater installed in the conveyor 10 bottom, for example. Furthermore, it becomes possible [ also omitting a pusher 82 ] by conveying holding the tab lead t of the upper surface of photovoltaic cell c by the attachment component 72 like the equipment of a work example.

[0039] Moreover, the form of photovoltaic cell c may be not only a quadrangle but a round shape, the polygon of SUKURANDO and others, etc., and you may make it connect the tab lead t of one, or the tab lead t of three or more to photovoltaic cell [ of one sheet ] c. Moreover, conveyance by a conveyor 10 may be not only intermittent movement but continuation movement. Moreover, in the maintenance mechanism 50, you may equip the tip portion of each presser bar 56 with one or three attachment components 72 or more.

[0040]  
[Effect of the Invention] According to the soldering equipment of this invention, a different process on a supply stage and a connection stage can be performed in parallel, and a string can be manufactured continuously efficiently. Moreover, since it is not necessary to prepare a heating machine style, a sticking-by-pressure mechanism, etc. in a supply stage, and to prepare the positioning mechanism of a tab lead etc. in a connection stage, small and cheap soldering equipment can be offered and the manufacture cost of a solar cell can also be reduced. Moreover, during conveyance to a connection stage from a supply stage, since a photovoltaic cell and a tab lead are held by a maintenance mechanism, a position gap does not occur.

#### [Brief Description of the Drawings]

[Drawing 1] It is the perspective view showing roughly the whole soldering equipment concerning the form of operation of this invention.

[Drawing 2] It is the elements on larger scale of a conveyor.

[Drawing 3] (a) is the top view showing the state where the first photovoltaic cell and a tab lead are carried on a conveyor on a supply stage, and (b) is the top view showing the state where the following photovoltaic cell and a tab lead are carried on a conveyor on a supply stage.

[Drawing 4] It is the side view of a maintenance mechanism.

[Drawing 5] It is an A-A section \*\*\*\* figure in drawing 4 .

[Drawing 6] They are the preliminary heating heater and this heating heater which were formed in the connection stage, and a pusher's explanatory view.

[Drawing 7] It is the explanatory view of the conveyor divided into two or more.

[Drawing 8] It is the explanatory view of the belt arranged in the lower part of a tab lead, and the center of a photovoltaic cell.

[Explanations of letters or numerals]

c Photovoltaic cell

t Tab lead

1 Soldering equipment.

10 Conveyor

11 Supply Stage

12 Connection Stage

50 Maintenance Mechanism

55 Endless Belt

56 Presser Bar

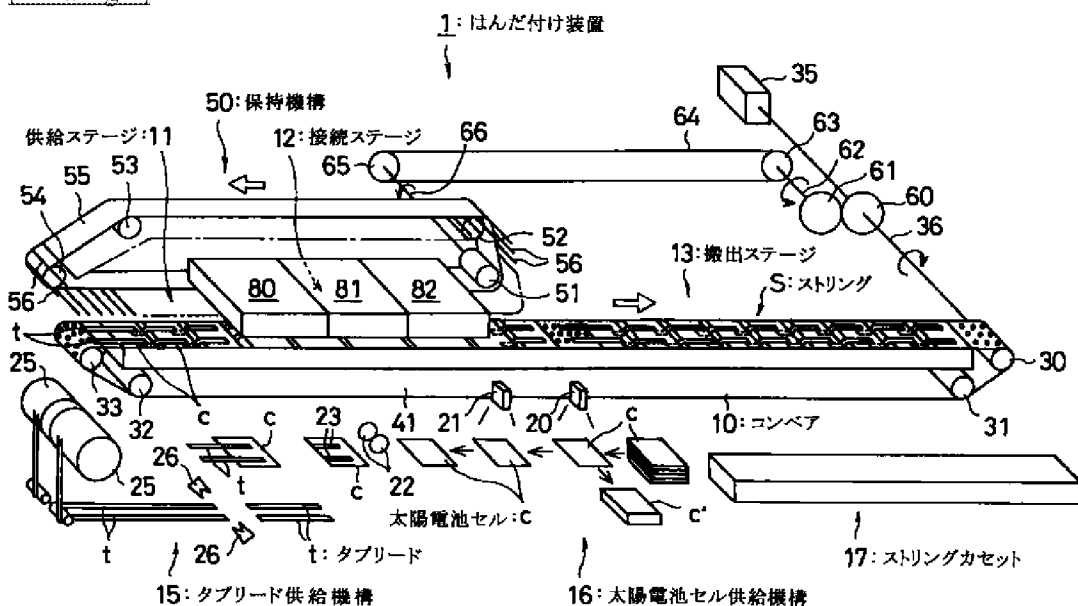
72 Attachment Component

80 Preliminary Heating Heater

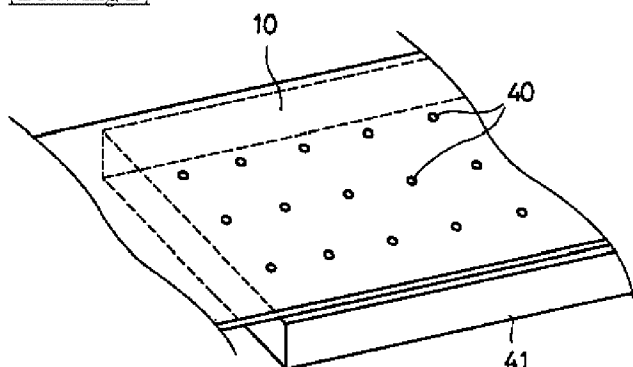
81 This Heating Heater

82 Pusher

[Drawing 1]

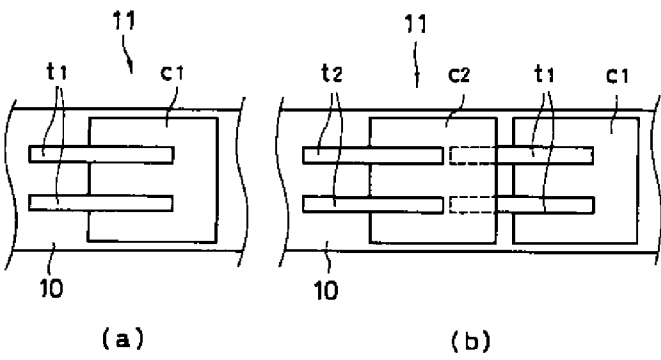


[Drawing 2]

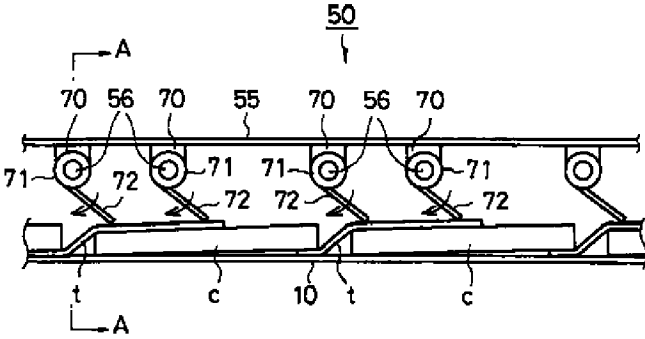


[Drawing 3]

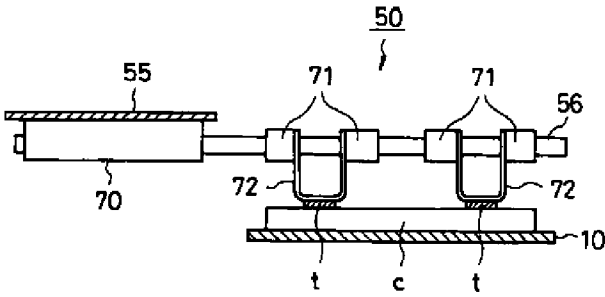




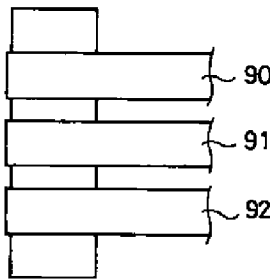
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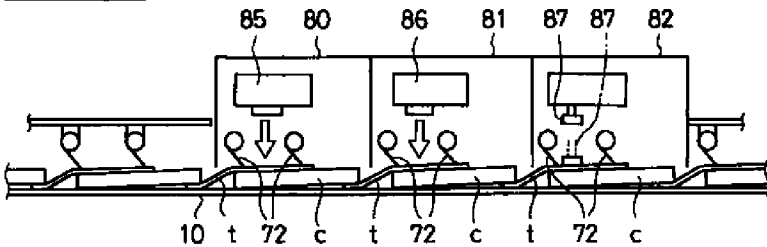
[Drawing 5]



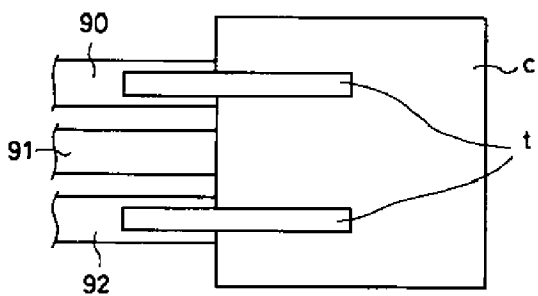
[Drawing 7]



[Drawing 6]



[Drawing 8]



[Translation done.]

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